

EMERGENCY REMOTE TEACHING AND LEARNING VS FACE-TO-FACE: WHEN ARE STUDENTS MORE LIKELY TO FALL BEHIND?

A. Knoetze*

<https://orcid.org/0000-0003-2806-4877>

Y. du Toit*

<https://orcid.org/0000-0002-3228-1228>

*School of Accountancy

Stellenbosch University, Stellenbosch, South Africa

ABSTRACT

The COVID-19 global pandemic brought about a shift from traditional face-to-face teaching and learning to emergency remote teaching and learning (ERT) in higher education institutions across the world. Prior studies have explored both instructor and student perceptions of ERT and identified self-regulated learning (SRL) as a major challenge. The question remains whether perceptions translate to student behaviour and if so, it will be important to address these self-regulation challenges as poor SRL has been linked to weaker academic achievement. This study investigated whether students exhibit inferior SRL strategies in ERT by falling further behind, as compared to a face-to-face setting. In order to measure how far behind students are, student access log-data from four undergraduate modules offered at Stellenbosch University in the 2019 (face-to-face setting) and 2020 (ERT setting) academic years were used. An analysis of variances model tested whether there was a difference in the number of days that students were behind for the two modes of teaching and learning. The results indicate that students are indeed more likely to fall behind during ERT as compared to face-to-face teaching and learning, thus exhibiting inferior SRL. This was statistically significant and pervasive across the different modules and time period investigated. These results will be of interest to higher education institutions as the onslaught of the pandemic has not only highlighted the need for improved ERT readiness, but it has also brought to the fore the need for a more digitally integrated offering as standard practice. Since it is unlikely that higher education institutions will return to a model identical to the pre-COVID-19 offering, this study contributes to finding the focus areas that will need to be addressed in a future hybrid model of teaching and learning.

Keywords: emergency remote teaching (ERT), access logs, COVID-19, self-regulated learning, Moodle

INTRODUCTION

On 11 March 2020 the World Health Organisation (WHO) declared COVID-19 a global pandemic (Adhanom Ghebreyesus 2020) and South Africa followed suit when President Cyril

Ramaphosa declared the COVID-19 pandemic a national state of disaster on 15 March 2020 (Ramaphosa 2020). Face-to-face lectures were suspended at all South African higher education institutions (Staff Writer 2020a). By April 2020, approximately 1.5 billion students worldwide were displaced as a result of schools and higher education institutions temporarily closing due to COVID-19 (Castonguay 2020). In an attempt to salvage the academic year, many academic institutions shifted from face-to-face teaching and learning to emergency remote teaching and learning (ERT), and South Africa was no different, with the Department of Higher Education mandating all higher education institutions to offer ERT from 1 June 2020 (Staff Writer 2020b).

For many instructors, this swift transition to ERT left them feeling overwhelmed and uncertain. In a study combining contributions from instructors from 45 different countries, Sangster, Stoner, and Flood (2020) note that most universities had no prior experience on how to deal with such a large scale emergency and that there was an overall lack of contingency planning for ERT.

ERT should not be confused with online teaching and learning, as there are distinct differences between these two approaches. Online teaching and learning is the intentional development of online study material where each step of the design process is analysed and considered to ensure that effective teaching and learning takes place (Hodges et al. 2020). ERT, on the other hand, is the swift adaptation of study material designed for face-to-face instruction, into an online delivery mode under emergency circumstances (Hodges et al. 2020). These two modes differ structurally, as online teaching and learning uses regular interactive online tools and activities such as online quizzes, polls and self-assessment techniques. In contrast, when looking at ERT, minor modifications are made to face-to-face material before it is provided in an online format.

These two modes also differ conceptually since instructors in ERT lose the ability to provide emphasis and context to the face-to-face material now used in ERT. Instructors in ERT are unable to gauge real-time when students require more input and clarification. With ERT, the educational ecosystem is not recreated, but rather adapted to ensure students have access to resources (Hodges et al. 2020). When preparing an online course, instructors would be cognisant of the fact that these elements are lacking and would therefore carefully consider how to atone for their absence (Iglesias-Pradas et al. 2021). Furthermore, in an online setting, students choose this mode of studying, while in an ERT setting students are forced to make use of this mode of studying. Therefore, the rapid transition of using face-to-face material for ERT purposes, usually results in a decline in the quality of the teaching provided and learning effected.

Many instructors have mentioned that they perceived students to be less engaged in their

studies during ERT (Sangster et al. 2020), which could contribute to students falling behind and eventually resulting in a higher dropout rate. Fogarty (2020), in his reflections on the impact of COVID-19 on accounting education, notes that students have needed to become more self-regulating – especially in situations where asynchronous techniques, as in ERT, were applied. He comments, “Being able to access study materials anytime can easily become accessing them at no time” (Fogarty 2020, 568). This is reverberated by students having expressed a perception that they struggle during ERT with many of the aspects of self-regulated learning (SRL), such as time management, study environment management and motivation (Fadda 2019; Shim and Lee 2020; Ontong and Mbonambi 2021).

Sangster et al. (2020) call for research to validate these perceptions of instructors and students regarding ERT by evaluating the impact of ERT on student engagement. In an attempt to examine this, this study uses quantitative analysis to explore the question – do students exhibit weaker self-regulation in ERT compared to a face-to-face setting, and as a result, fall behind and disengage in their study programme?

If students are indeed more likely to fall behind, this can be used as a starting point to guide higher education institutions on where the current ERT offering can be improved. This is especially important for Africa as the continent has recorded the world’s slowest COVID-19 vaccination rate as at June 2021 (Staff Writer 2021). Consequently, many African higher education institutions are still using ERT in 2021, with no expectation of returning to face-to-face instruction anytime soon. Additionally, with political unrest and economic volatility (Cilliers 2018), the African continent is more prone to disruptions in education and consequently, ERT will remain relevant in the future for African higher education institutions. Lastly, since it is unlikely that higher education institutions will return to a model identical to the pre-COVID-19 offering, the results of this study can contribute to finding the focus areas that will need to be addressed in a future hybrid model of teaching and learning.

A more detailed discussion of the relevant literature follows. The research methodology is then described, followed by the results. Finally, a summary of the findings, with concluding remarks, is provided.

LITERATURE REVIEW

While the COVID-19 pandemic is not the first crisis to prompt higher education institutions to use ERT, it certainly is the most severe in terms of the number of people and the extent to which people have been affected. Higher education institutions have previously had to use ERT for short periods of time due to, *inter alia*, conflict and violence targeting educational institutions in Afghanistan (Hodges et al. 2020), hurricane Katrina in the United States of America (Gelles

et al. 2020) and the Fees Must Fall movement in South Africa (Czerniewicz, Trotter, and Haupt 2019). However, the COVID-19 pandemic has seen higher education institutions move to ERT for more than half of the 2020 academic year, with most South African higher education institutions continuing to use ERT in the 2021 academic year (Monama 2021). This has resulted in renewed research focusing on ERT, but ERT literature remains limited compared to literature regarding online teaching and learning. As Hodges et al. (2020) have indicated, there are distinct differences between ERT and online teaching and learning, but there are also shared characteristics. These characteristics include the asynchronous nature of teaching and learning, the shared education medium being online, and the need for SRL. Consequently, where appropriate, studies examining online teaching and learning have also been included in this literature review. By evaluating a combination of ERT and online teaching and learning studies, it highlights unique gaps in the current literature and expresses a further need for research to explore ERT.

To date many ERT studies focus on trying to gain an understanding of instructors' and students' perception about ERT through surveys and in-depth interviews. A prominent theme which has emerged, is that students appreciate the level of flexibility that ERT has afforded them (Ferri, Grifoni, and Guzzo 2020; Mohammed et al. 2020; Shim and Lee 2020; Ontong and Mbonambi 2021). This is in line with literature on students' perception about online teaching and learning (Paechter and Maier 2010; Francis, Wormington, and Hulleman 2019). In both ERT and online teaching and learning, students do not have to attend learning opportunities at a specific time or place, and it is this asynchronous component that provides greater flexibility (Broadbent and Poon 2015; Baker et al. 2019). However, greater flexibility brings about the need for more SRL, which has attracted attention in the ERT and online teaching and learning research sphere (Paechter and Maier 2010; Broadbent and Poon 2015; Mahlaba 2020).

The concept of self-regulation has many aspects (Zimmerman 2008). Based on reviews of the literature, Fadda (2019) as well as Lynch and Dembo (2004) proposed that there are five components of self-regulation that are particularly important in the online learning context: motivation, internet self-efficacy (experience with internet technology), study environment management, time management and learning assistance management. Due to the shared characteristics of ERT and online teaching and learning, it is expected that these components will also be important in ERT.

Motivation in both ERT (Ferri et al. 2020) and online teaching and learning (Paechter and Maier 2010; Kim and Frick 2011; Francis et al. 2019), is experienced as a major challenge for students. Students have reported that the lack of instructor immediacy (Baker 2004), interaction with their peers (Paechter and Maier 2010) and the lack of social connections between students

(Gelles et al. 2020) contribute to this lack of motivation in an ERT and online teaching and learning setting. Although internet self-efficacy has not been identified as a noteworthy challenge in recent literature, study environment management, however, remains challenging for many students. Study environment management encompasses having both a quiet study space conducive to learning and having access to the technology and resources required for online learning (reliable internet, consistent electricity, a smart phone and a computer) (Lynch and Dembo 2004; Shim and Lee 2020). In Africa, which mostly comprises of developing countries, this is particularly challenging, where students are faced with interrupted electricity supply and limited access to technology and resources (Mittelmeier et al. 2019; Ontong and Mbonambi 2021). The challenge of study environment management, similar to the other SRL challenges, has been reiterated in both the online teaching and learning (Mittelmeier et al. 2019) and ERT environments (Shim and Lee 2020; Ontong and Mbonambi 2021).

When focusing on the time management component, previous studies have shown that procrastination is the failure of time management (Klingsieck et al. 2012). Even in face-to-face teaching and learning environments, procrastination is highly prevalent among students (Rabin, Fogel, and Nutter-Upham 2011). Michinov et al. (2011) found that procrastinators were less likely to excel in an online teaching and learning environment than non-procrastinators. Interestingly, when comparing a group of face-to-face students with online teaching and learning students, Elvers, Polzella, and Graetz (2003), found that procrastination was negatively related to motivation and academic achievement for the online teaching and learning group, but not for the face-to-face group. In ERT research, procrastination and time management have not been afforded as much attention, but students have indicated that they tend to procrastinate more in an ERT setting (Gurung and Stone 2020).

Lastly, learning assistance management, also called help-seeking skills (Fadda 2019), requires that students seek the necessary assistance in order to optimise their own learning (Lynch and Dembo 2004). In previous studies a significant positive correlation was found between help-seeking and academic achievement (Lynch and Dembo 2004; Broadbent and Poon 2015; Fadda 2019). In students' perceptions about ERT they mentioned that, not being able to ask questions during (Gelles et al. 2020) and after class (Shim and Lee 2020), as well as the lack of a relationship with the instructor, are major disadvantages of ERT. When a student is unable to ask questions, or there is an absence of a student-instructor relationship, it results in students not reaching out when they need assistance (Shim and Lee 2020).

These components of self-regulation which are especially challenging in ERT and online teaching and learning, are also inextricably linked to one another and have significant intercorrelations. Lack of motivation has been linked to increased procrastination (Michinov et al. 2011), and similarly, interventions to improve motivation have been found to decrease

procrastination (Zimmerman 2008). Having poor technological resource and study environment management impacts motivation (Ontong and Mbonambi 2021). Internet self-efficacy has also been linked to increased motivation in online learning (Kim and Frick 2011). In combination, all these self-regulation components have been identified as challenges by both students (Bawa 2020; Gelles et al. 2020) and instructors (Czerniewicz et al. 2019) in their perceptions of ERT, with online teaching and learning research also signifying self-regulation as a major challenge (Klingsieck et al. 2012; Baker et al. 2019; Mittelmeier et al. 2019).

It is important to address self-regulation challenges in any teaching and learning environment because an increased level of self-regulation has a positive impact on academic achievement. Beattie et al. (2019) found this to be true in a traditional face-to-face university setting. In a meta-analysis carried out on studies conducted from 2004–2014, Broadbent and Poon (2015) found a significant positive correlation between SRL strategies and academic achievement in the online teaching and learning environment. You (2016) studied the correlations between academic achievement and proxies of SRL, such as regularity of study, total study time and attendance of learning sessions, by using learning management system data in an online teaching and learning setting. Regular study was found to be the strongest indicator of academic achievement.

In the current context of the COVID-19 pandemic, SRL is repeatedly cited as one of the main challenges (Fogarty 2020; Sangster et al. 2020) during ERT. Since ERT differs from online teaching and learning, both structurally and conceptually, the findings from prior online teaching and learning research cannot be transferred to ERT as such. ERT is thus a separate mode of teaching and learning which needs to be examined independently. The question, thus, remains whether perceptions regarding ERT translate to measurable student behaviour. The extended period of ERT in 2020 provided a unique context to investigate whether there is quantitative evidence that students, in line with their and instructors' perceptions, exhibit poorer SRL strategies in ERT than in face-to-face teaching and learning. When students exhibit poor SRL strategies they are more likely to fall behind and disengage in terms of their study programme, as they are unmotivated, procrastinate more, feel isolated, and struggle to manage their time and study environment. It was anticipated that determining whether students are, indeed, more likely to fall behind in ERT would indicate whether their perception about SRL in an ERT setting is evidenced in their behaviour.

This is of importance as many researchers have commented that education has been changed forever by the COVID-19 pandemic, (Iglesias-Pradas et al. 2021; Niemczyk, De Beer, and Steyn 2021; Wolhuter 2021) and that the situation provides higher education institutions not only with an opportunity, but rather a responsibility to adapt to a more digital offering (Wolhuter 2021). Since Africa is lagging behind in terms of COVID-19 vaccinations (Staff

Writer 2021), ERT will remain in place for the foreseeable future. It is therefore vital to identify areas for improvement in order to retain academic quality. Furthermore, since it is unlikely that higher education institutions around the world will return to a model identical to the pre-COVID-19 offering, these results can contribute to finding the focus areas that will need to be addressed in a future hybrid model of teaching and learning.

When transitioning to this future model, Fogarty (2020) notes that the status quo always has the upper hand in the battle of persuasion. In the past, advocates for a more an online service offering had to provide the justification for a change from face-to-face instruction, whereas these roles have now been reversed. Care will, however, need to be taken when transitioning from a temporary (emergency) service offering to a post-COVID-19 educational system. One particular place of caution to note is that many inefficiencies and problems in the current ERT offering may become the norm as instructors and students become used to the ERT offering due to its extended use. This poses the risk that these inefficiencies and problems may not be addressed in the current ERT offering and could be incorporated into the new post-COVID-19 offering. A proper understanding of the current challenges and how ERT differs from online teaching and learning will allow higher education institutions to continually improve their ERT offering, and most importantly ensure that all students, especially students in Africa who lack the infrastructure and who struggle with socio-economic challenges, are not left behind (Usher, Hershkovitz, and Forkosh-Baruch 2021).

Hopefully, the post-COVID-19 educational system will also be more cognisant of the need for ERT response planning. Sangster et al. (2020) point out that the final phase of the pandemic should be redesigning systems and processes in order to be better prepared for future crises. With education in Africa being prone to disruption due to political unrest and economic volatility (Cilliers 2018), ERT will remain an important tool which can be used to overcome these disruptions in the future. Ensuring higher education institutions are properly prepared for such future crises, with a high quality ERT offering, is therefore even more important in the African context. The findings of this study can thus inform higher education institutions about the challenges that will need to be addressed in order to enhance future ERT responses, and find the balance between digital integration and face-to-face contact in a future hybrid educational model.

RESEARCH METHODOLOGY

Research design

The research methodology used in this study was quantitative with an *ex post facto* research design. This research design was selected as the events had already taken place and therefore

no variables could be manipulated. The independent variable of interest was the mode of teaching and learning (*Year*), with 2020 representing ERT and 2019 representing face-to-face teaching and learning. Additionally, the modules (*Module*), as well as the order in which the topics were lectured (*Topic*) were considered. The dependent variable was how far behind a student was in his or her study programme (*Days behind*), which related to a student's SRL strategy. In order to measure *Days behind*, student access log-data from four undergraduate modules offered at Stellenbosch University (SU) in the 2019 and 2020 academic years were used.

Context of the study

SU, along with many other universities in South Africa, commenced with ERT on 20 April 2020, the start of the second term (Du Plessis 2020). Figure 1 provides a timeline of the relevant events leading up to the start of ERT at SU. At SU, the traditional face-to-face mode of teaching and learning was used in all four terms of the 2019 academic year, while in 2020 face-to-face teaching and learning was used only during the first term, and ERT in the second, third and fourth terms. In order to make the 2019 and 2020 academic years comparable in the study, the first terms for both the academic years were disregarded. Furthermore, to increase comparability, the SU undergraduate modules which were selected had the same topics and content lectured within a specific module in the 2019 and 2020 academic years. All modules were also taught in both the 2019 and 2020 academic years and were originally planned for face-to-face delivery.

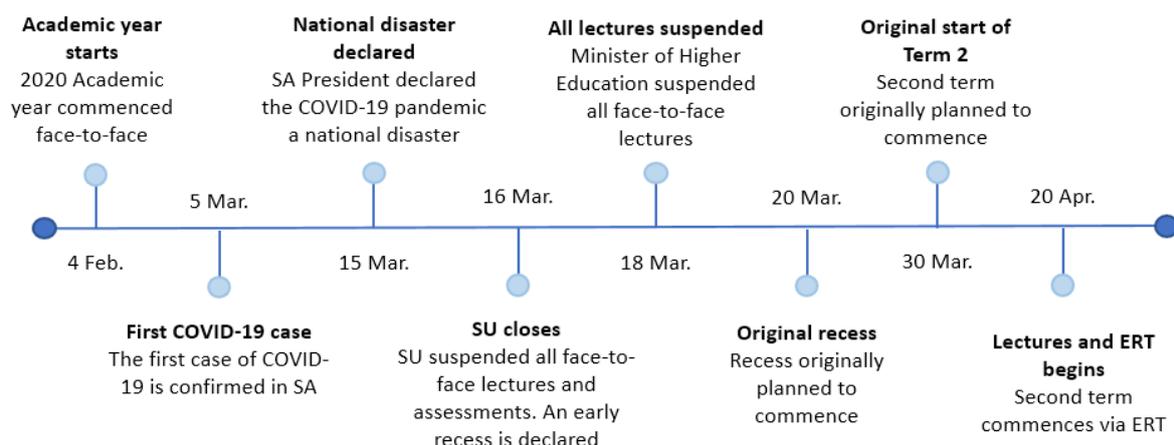


Figure 1: Timeline of events leading up to the start of ERT at SU due to COVID-19

These four modules all relate to the same academic field, namely Management Accounting, but

differ in terms of the year of study and the degree towards which students are studying. Two of the four modules form part of the Bachelor of Commerce (BCom) degree, namely Management Accounting second and third year for BCom students (hereafter referred to as “MA288” and “MA388” respectively). The other two modules are included in the Bachelor of Accountancy (BAcc) degree, namely Management Accounting second and third year for BAcc students (hereafter referred to as “MA278” and “MA378” respectively). The BCom degree prepares students inter alia to advise on financial implications of projects or business decisions, formulate a business strategy, conduct internal business audits, and monitor spending and financial control (Stellenbosch University n.d.a). On the other hand, the BAcc degree is more specialised and prepares students to become auditors, accountants or consultants who perform statutory audits, provide tax and information technology advice, and assist with financial reporting and asset management (Stellenbosch University n.d.b). Furthermore, the BAcc degree requires a National Senior Certificate (NSC) overall average of at least 70 per cent, and 70 per cent for either Mathematics or Accounting in order to be admitted, whereas the majority of BCom degrees require a NSC overall average of 65 per cent, and 60 per cent for Mathematics (Stellenbosch University 2020). Using both the BCom and the BAcc students provided this study with not only a large group of students, but with two types of student groups who differ in their thinking and behaviour. This increased the validity of the study as well as the ability to generalise the findings of this study to a certain extent.

All four modules were full year modules with an average of 180 students registered for MA288 and MA388, 540 for MA278 and 650 for MA378. Both MA288 and MA388 had one Afrikaans and one English class, while MA278 and MA378 had one Afrikaans and two English classes. Except for MA288, which was presented in the format of three compulsory lectures per week, the other three modules all had four compulsory lectures per week. Moreover, MA278 and MA378 each had one voluntary lecture per week in which additional help was offered to students. This was done by working through previous assessment questions in order to teach students how to approach a question and how to apply the theory in a practical manner. The number of compulsory and voluntary lectures, as well as the syllabus content, remained the same for the 2019 and 2020 academic years, despite the mode of teaching and learning changing.

For all the modules in 2019, students were provided with a module year programme that indicated the various topics taught throughout the year and their corresponding start dates. All lectures were presented from lecture slides which were uploaded onto the university’s online learning management system, Moodle. Students downloaded these lecture slides before attending the relevant lectures in order to follow what the instructor was presenting, and to

make additional notes. Question packs that were also uploaded onto Moodle accompanied the lecture slides. These question packs contained previous assessment questions that students could complete in their own time to practise the concepts taught in the formal lectures. All lectures in 2019 were presented face-to-face and the instructor therefore set the pace. If a student did not attend a lecture, the student missed the teaching and learning opportunity.

When SU shifted to ERT in the second term of 2020, many of these elements were kept the same. Students still received a module year programme with lecture slides and question packs per topic on Moodle. However, lecture slides with voice recordings or separate lecture videos replaced the face-to-face lectures. Once again, a topic's lecture slides had to be downloaded, but this time for the students to use them in conjunction with the lecture videos or voice recordings. The instructor guided the students through the lecture slides in the voice recordings or videos, explaining the various concepts as in class, but live questions and class discussions were absent. Additionally, students were provided with a weekly planning document on Moodle that set out which videos, voice recordings and lecture slides they were supposed to access and study in the allocated timeslot of the class. Students were therefore able to set their own pace, pausing and revisiting the explanation of certain concepts.

Participants

The participants of the study consisted of 3 082 SU students from the four undergraduate modules described above from both the 2019 ($n = 1\ 604$) and the 2020 ($n = 1\ 478$) academic years. All registered students from each module, except for 24 students in 2019 and 16 students in 2020 who had discontinued the module, were used in this study. The Management Accounting modules were selected as this approach provided a large group of students who all studied content from the same academic field, and therefore a comparable basis was provided. It also addressed any concerns relating to module bias from students, such as students preferring to study one particular module to another. Furthermore, including both BCom and BAcc students provided the study with two groups of students who differed in their way of thinking and behaviour, thus increasing validity and generalisability. Table 1 provides a summary of the number of participants per module per year.

In 2019, 4 per cent (2020: 5%) of the BCom participants took both MA288 and MA388 together, while only 1 per cent (2020: 1%) of the BAcc participants were registered for both MA278 and MA378.

Table 1: Participants per module

| Module | 2019 No. of students | 2020 No. of students |
|--------------|-------------------------|-------------------------|
| MA288 | 196 | 161 |
| MA388 | 194 | 157 |
| MA278 | 564 | 510 |
| MA378 | 650 | 650 |
| Total | 1 604 | 1 478 |

Data collection and measures

The independent variable *Year* was proxy for the mode of teaching and learning (2019: face-to-face and 2020: ERT). The dependent variable *Days behind* was taken as the number of days that students were behind in their study programmes.

To calculate the latter, the difference between the date on which a student first interacted with study material (X_i) was compared to the date on which the student should have interacted with the study material (X_t). In order to identify (X_i) and (X_t), data was collected from both the module year programmes and access logs on Moodle. The module year programmes were used to identify the various topics lectured in a year with the corresponding start dates. The start date of each topic provided the date that students should have interacted with the study material (X_t). Since a student had to download the study material from Moodle in order to start studying in both 2019 and 2020, a student was considered as having interacted with a topic's study material for the first time when they accessed the study material on Moodle. The date that the student first accessed the topic's study material as per the access logs on Moodle was consequently recorded as the date on which the student first interacted with the topic material (X_i). The combination of these two elements provided the following formula:

$$\text{Days behind } (y) = X_i - X_t$$

Where

- X_i is the date on which the student first interacted with the study material, as per Moodle, and
- X_t is the date on which the student was supposed to interact with the study material, as per the module year programme.

Students who were behind schedule would be identified as students who had interacted with the various topics' study material at a later stage as compared to the module year programme (where $(y) > 0$). In some cases, students accessed the study material (X_i) before the date on which they were supposed to interact with the study material (X_t). Since this study focused on whether students fell behind and not on whether the students worked in advance, (y) was

limited to zero. In other instances, students did not access certain topics' study material on Moodle at all. There are two possible explanations for this: either students never studied those topics, or a student could have accessed the study material by obtaining the material from a peer, and not by accessing the study material on Moodle. Since there was no method to quantify the number of days by which these students were behind, or to determine whether these students were actually behind, a no score was recorded as this was considered to be the most prudent method. To moderate for the impact of this, the percentage of students who never accessed certain topics' study material was noted separately in the analysis.

Limitations of the study

One of the limitations of this study is that it focused on only one academic field, namely Management Accounting. Consequently, the results might not extend to other academic fields, which provides an opportunity for future research to investigate. Secondly, previous studies evaluating the various components of SRL relating to students' online behaviour have used total login time, login frequency and login regularity (Jo et al. 2016; You 2016). These login proxies were used since the study material for an online course is developed to be used interactively in the various online learner management systems. The study material in this study's context was, however, designed to be downloaded and used offline, regardless of the mode of teaching. Thus, the student's first access log of a topic's study material was used, instead of the number of times the study material was accessed or the total access time. Even though accessing the study material did not provide evidence that the student truly engaged with the study material, it did indicate when a student took the first step to interact with the study material. In both mediums (ERT and face-to-face teaching and learning) the student could access and download the study material but not fully engage with it. This is noted as a limitation of the study and provides opportunity for future research.

Data analysis

A mixed-model analysis of variance (ANOVA) was used to investigate the number of days with which students fell behind. The students were entered into the model as random effect, with *Year* (proxy for ERT), *Module* and *Topic* entered as fixed effects. Fisher's least significant difference (LSD) was used for post hoc testing. Box plots were further used to illustrate the distributions of days behind.

Results

The ANOVA results are depicted in Table 2 and indicate that there was a difference between

the *Days behind* in 2019 and 2020 (*Year*), and that this difference was statistically significant ($p < 0.01$). Untabulated results indicate that, on average, students were 7.71 days behind in 2019, compared to 11.25 days in 2020. Students are therefore more likely to fall behind in an ERT setting. Furthermore, the ANOVA results showed that this was also the case for *Module* and *Topic* ($p < 0.01$), which means that *Year*, *Module* and *Topic* were all determinants of how far behind students were. While the *Year* effect indicated that students were indeed more behind in an ERT setting, the ANOVA interaction effects between *Module* and *Year*, and *Module* and *Topic* indicated that the difference found per *Year* was not independent of *Module* and *Topic*. These results were also statistically significant ($p < 0.01$). Consequently, the differences per *Year* were further analysed per *Module* and per *Topic*.

Table 2: Results of the mixed-model ANOVA

| | Sum of squares | Mean square | F | p-value ^a |
|----------------|----------------|-------------|--------|----------------------|
| Year | 29 129.46 | 29 129.46 | 165.28 | < 0.01 |
| Module | 75 763.03 | 25 254.34 | 143.29 | < 0.01 |
| Topic | 89 571.87 | 5 971.46 | 33.88 | < 0.01 |
| Module X Year | 7 414.07 | 2 471.36 | 14.02 | < 0.01 |
| Module X Topic | 119 427.31 | 7 961.82 | 45.18 | < 0.01 |

This table shows the results of the mixed-model ANOVA which investigated whether students exhibited inferior SRL strategies by falling further behind in ERT as compared to face-to-face teaching and learning. *Module* indicates the four different Management Accounting undergraduate modules. *Topic* is the order in which the topics were presented. *Year* is proxy for the mode of teaching and learning (face-to-face teaching and learning in 2019, and ERT in 2020). In 2019 $n = 21\ 070$ and in 2020 $n = 18\ 567$. ^a p -Values are two tailed.

Looking at the analysis per *Module*, Figure 2 shows the mean *Days behind* per *Module* per *Year*. All students in all four modules were further behind in 2020 when ERT was the mode of teaching and learning. MA288 students were further behind in 2020 by 6.4 days, which is the greatest difference, while MA378 students were only behind by 3.1 days, which is the smallest difference. MA278 and MA378 students were further behind in 2020 by 3.4 days and 3.1 days respectively. All of these differences were statistically significant ($p < 0.01$), indicating that in all four undergraduate modules, students were further behind when ERT was the mode of delivery.

In terms of the analysis per *Topic*, topics lectured during the year were numbered as the x^{th} topic per term, for example the second term's first topic would be numbered T2.1 and the fourth term's third topic would be numbered T4.3. In Figures 3.1, 3.2, 3.3 and 3.4 the *Days behind* per *Topic* per *Year* is presented for each of the four modules. Circled topics indicate the topics where students were not only further behind in 2020 than in 2019, but also when this difference was statistically significant at a 5 per cent confidence level.

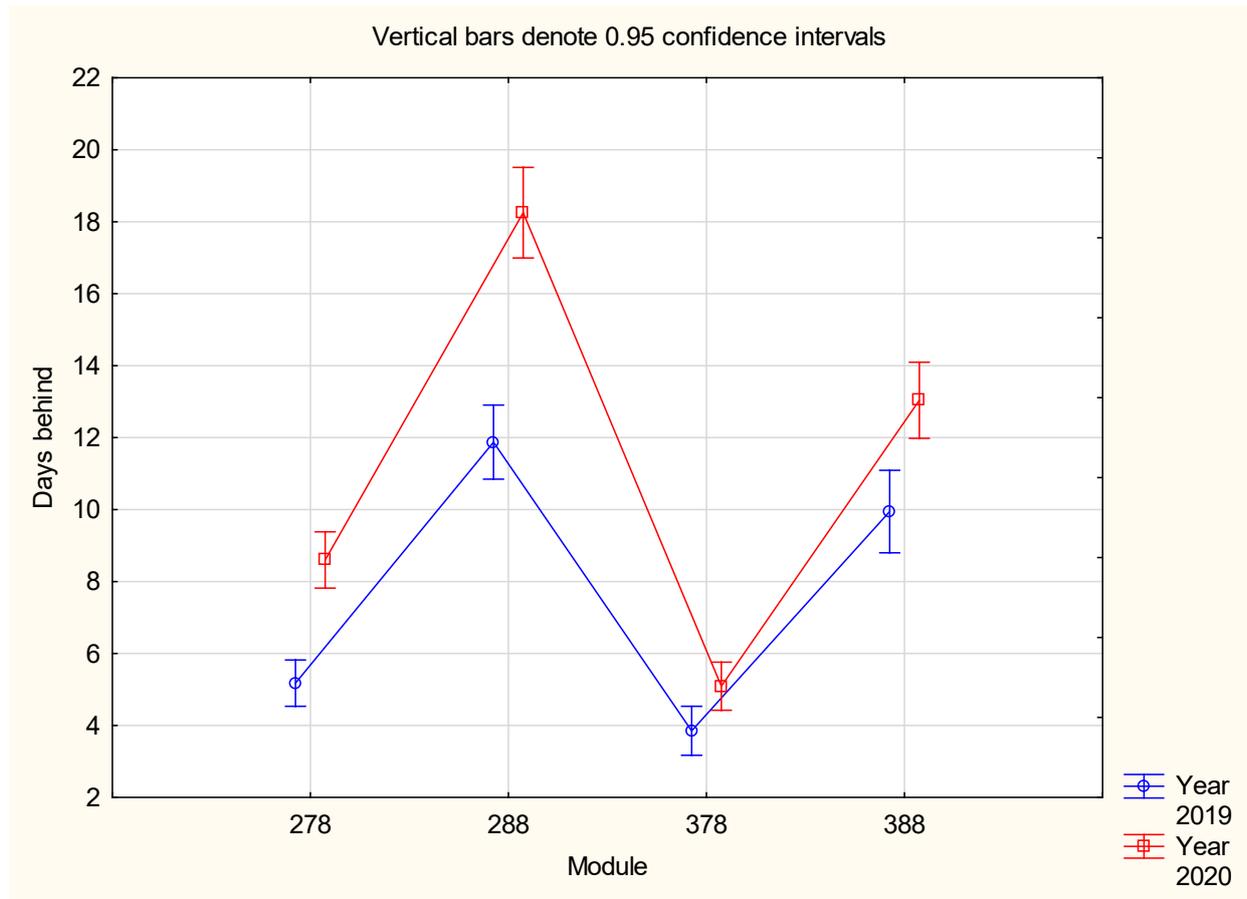


Figure 2: Least square mean *Days behind* per *Module*, per *Year*

Figures 3.1, 3.2, 3.3 and 3.4 give an indication of whether students in a certain module were falling behind schedule at a particular time of the year. The problem appears to have been pervasive throughout the year, even though MA278, MA288 and MA388 students appear to have been particularly far behind at the end of term 3 and during term 4. In MA378, topic 2.1 in 2019 appears to have been an outlier. The module instructors provided anecdotal commentary that in 2019 they tried to approach the topic in a different manner by using more handwritten notes in class. As a result, many students may not have considered it necessary to download the study material on Moodle.

In Figure 4, boxplots show the distribution of *Days behind* per *Year* per *Module*. In this analysis only, the average *Days behind* per student across all the topics lectured was used as the observations, as opposed to the other analyses where each topic’s *Days behind* per student were used as individual observations. The boxes indicate the second and third quartile, being the middle 50 per cent of observations. Outliers (identified as having a coefficient of higher than 1.5) were excluded. In MA278, MA288 and MA378 the *Days behind* of the bottom 25 per cent

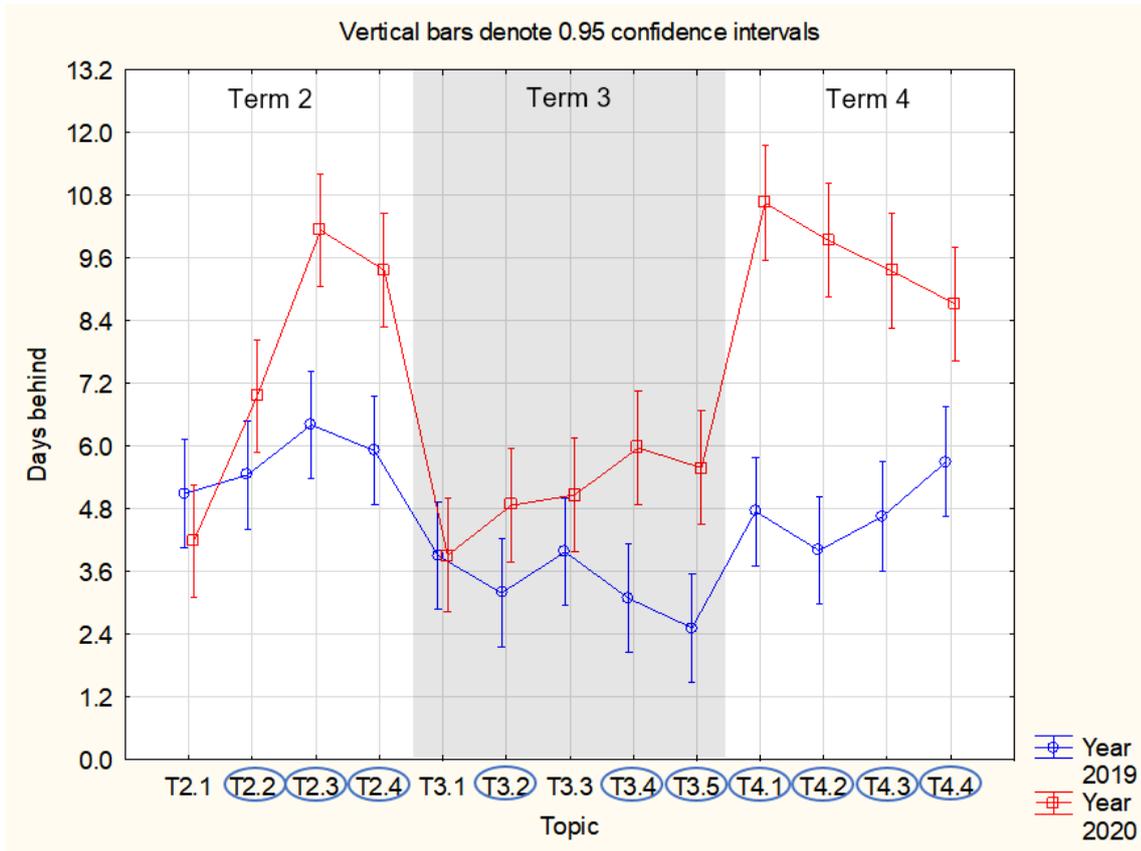


Figure 3.1: Least square mean *Days behind* per *Topic*, per *Year* for MA278

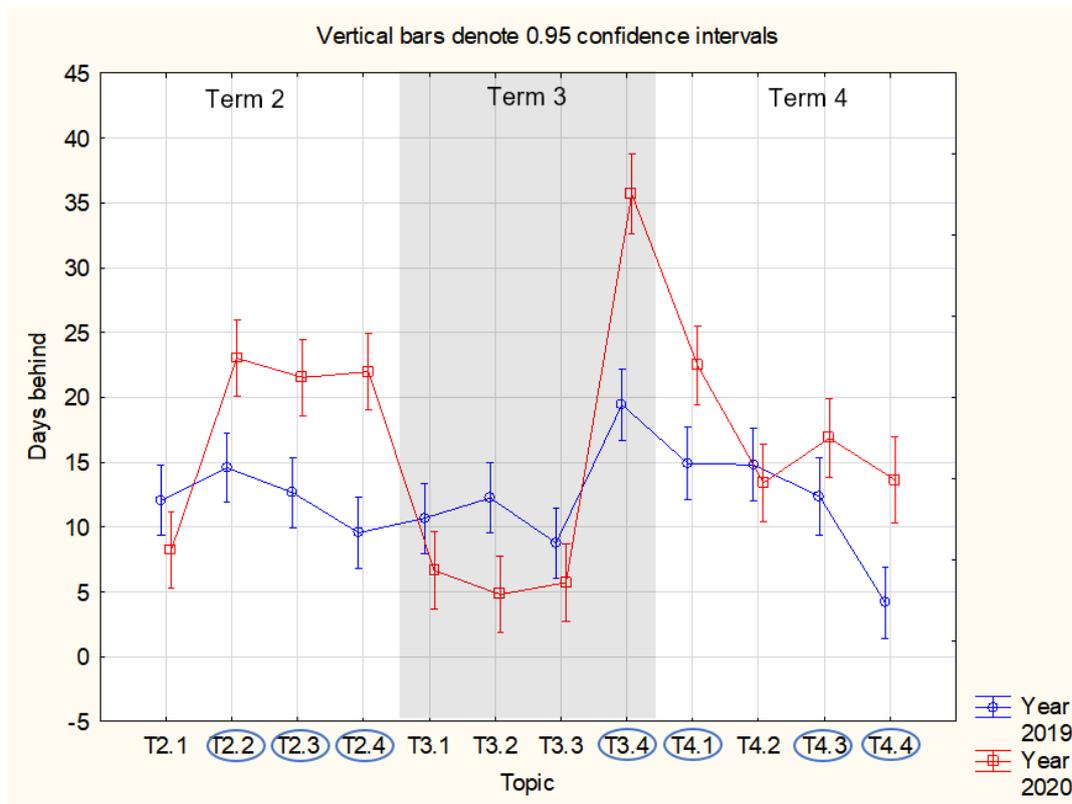


Figure 3.2: Least square mean *Days behind* per *Topic*, per *Year* for MA288

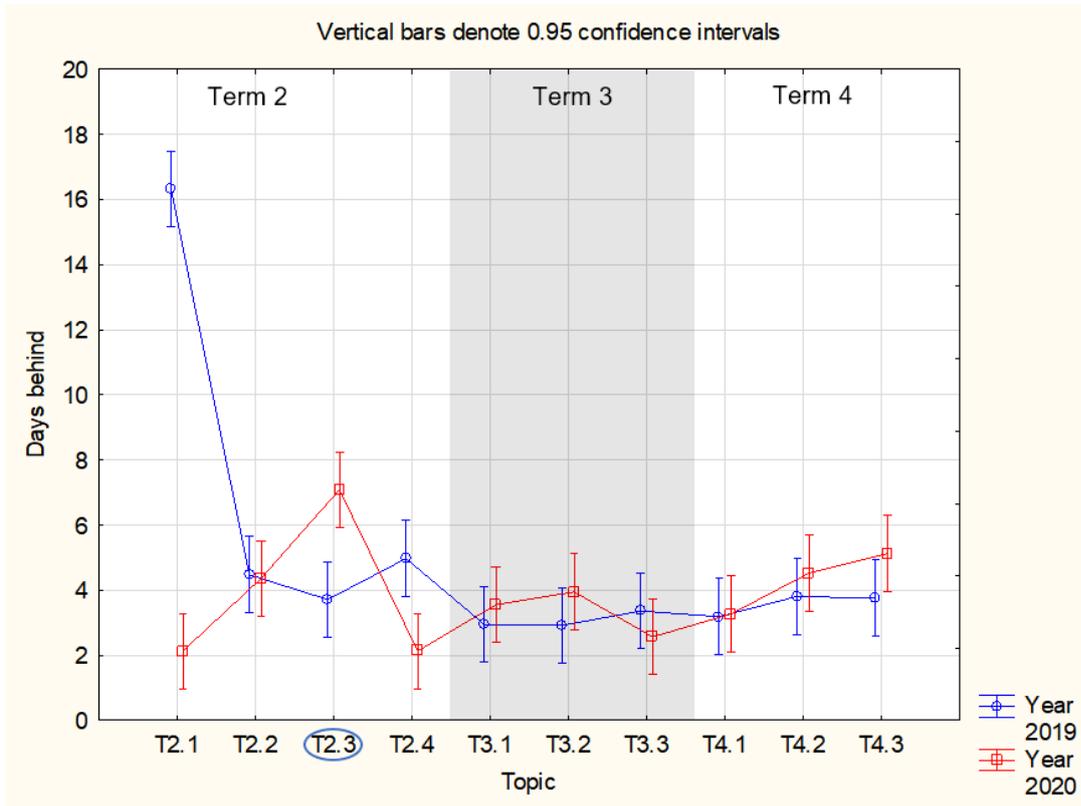


Figure 3.3: Least square mean *Days behind* per *Topic*, per *Year* for MA378

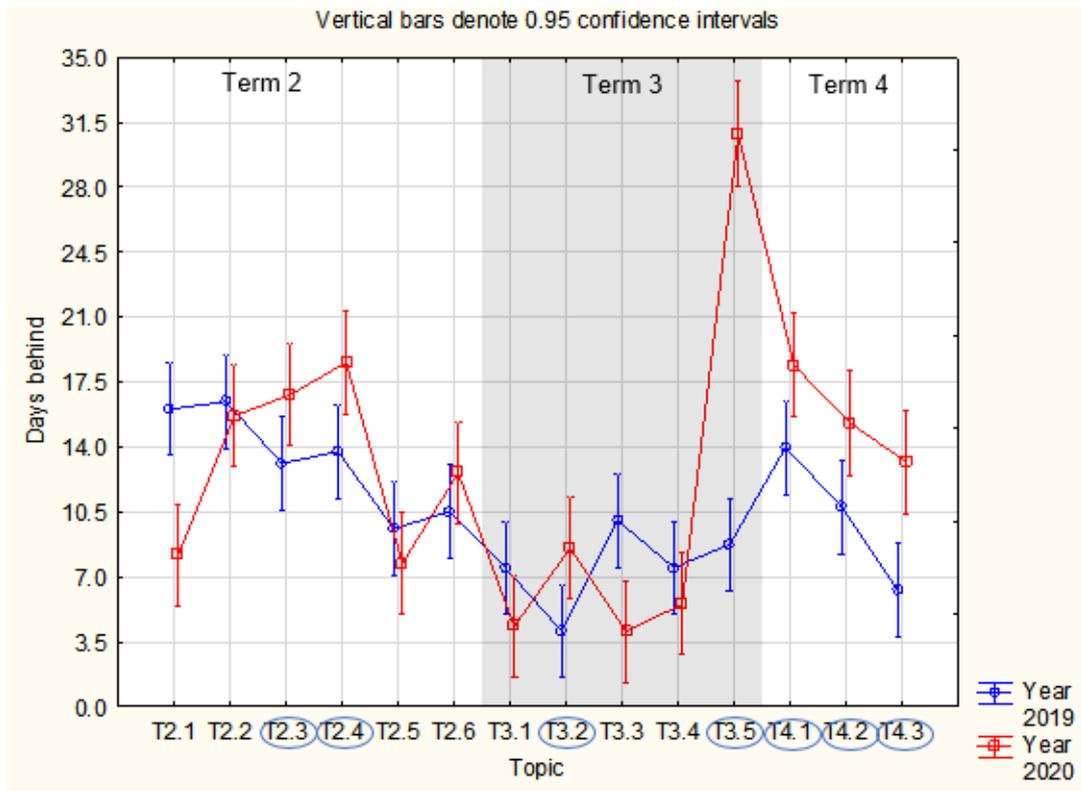
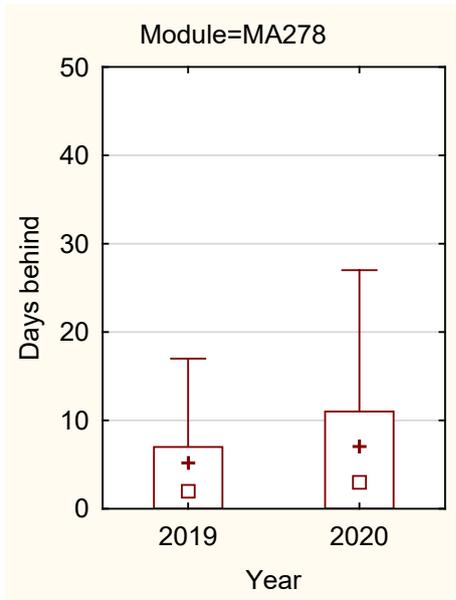
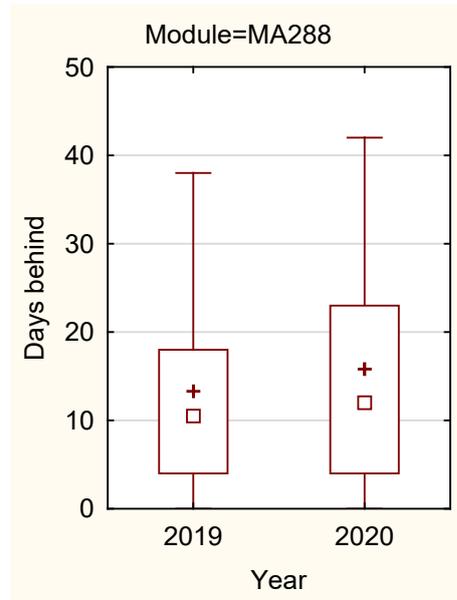


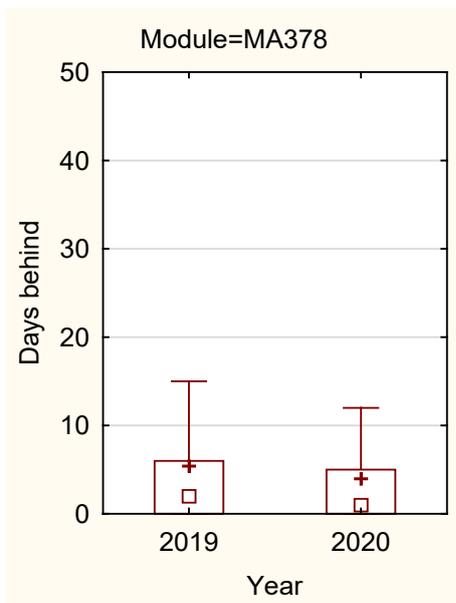
Figure 3.4: Least square mean *Days behind* per *Topic*, per *Year* for MA388



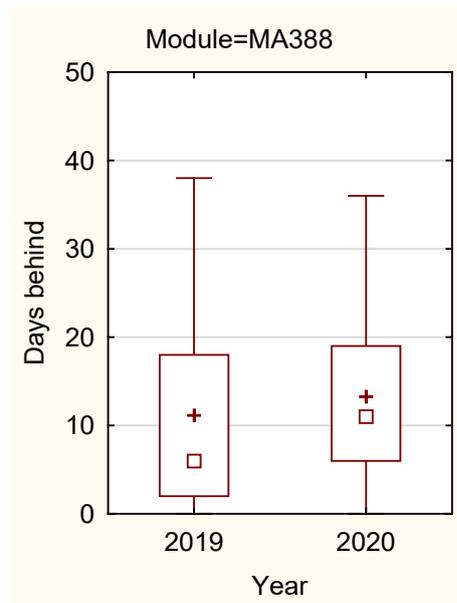
| MA278 | 2019 | 2020 |
|--------------------------|------|------|
| Min | 0 | 0 |
| 25% | 0 | 0 |
| Median | 2 | 3 |
| 75% | 7 | 11 |
| Non-outlier range | 17 | 27 |



| MA288 | 2019 | 2020 |
|--------------------------|------|------|
| Min | 0 | 0 |
| 25% | 4 | 4 |
| Median | 10.5 | 12 |
| 75% | 18 | 23 |
| Non-outlier range | 35 | 42 |



| MA378 | 2019 | 2020 |
|--------------------------|------|------|
| Min | 0 | 0 |
| 25% | 0 | 0 |
| Median | 2 | 1 |
| 75% | 6 | 5 |
| Non-outlier range | 15 | 12 |



| MA388 | 2019 | 2020 |
|--------------------------|------|------|
| Min | 0 | 0 |
| 25% | 2 | 6 |
| Median | 6 | 11 |
| 75% | 18 | 19 |
| Non-outlier range | 38 | 36 |

Figure 4: Boxplots of *Days behind* per *Year* per *Module* with  depicting the median,  the 25–75 percentile,  the non-outlier range and  the mean

of students (students who are most up to date) remained unchanged from 2019 to 2020. In MA278 and MA378 this quartile of students was on average zero *Days behind*, whereas MA288's bottom 25 per cent of students were an average of four *Days behind*. Only in MA388 did the bottom 25 per cent of students' *Days behind* increase from two to six days, on average.

In MA278 and MA288, the second, third and fourth quartiles of students were further behind in 2020 than in 2019, while this was the case for the first, second and third quartiles of students in MA388. This means that 75 per cent of students were, on average, further behind in an ERT setting. Only in MA378 did the *Days behind* of all quartiles of students reduce. Referring to Figure 3.3, the average *Days behind* for MA378 in 2019 could be driven by topic 2.1, for which the *Days behind* appears to be an outlier.

Overall, the results have shown that the students fell behind in their studies and that this outcome was driven by the mode of teaching and learning (*Year*), as well as the *Module* and *Topic* variables. When recording the *Days behind*, a no score was recorded for students who did not access certain topics' study material on Moodle at all. Since the percentage of students who did not access certain topics in 2019 and 2020 remained 2 per cent for both years, recording a no score should not have an impact on these results.

CONCLUSION

In January 2021, almost a year after the start of the COVID-19 pandemic, more than half of the world's student population still faced disruptions in their education due to full closure of academic institutions, reduced academic programmes or a shift to ERT (UNESCO 2021). It appears that higher education institutions will remain challenged by the current pandemic for some time to come. Various questions remain unanswered such as how long one can keep referring to the current situation as temporary, as well as which changes effected during the ERT service offering will remain indefinitely and which will be phased out (Iglesias-Pradas et al. 2021).

This study answers the call of Sangster et al. (2020) to evaluate the impact of ERT on student engagement. The purpose of this study was to determine whether students exhibit inferior SRL by falling further behind, and thus disengaging in their study program, in an ERT setting as opposed to a face-to-face setting. Previous studies have indicated that poor SRL has been linked to weaker academic achievement (Broadbent and Poon 2015; Beattie et al. 2019). The results of the present study indicated that students were indeed more likely to fall behind during ERT as compared to face-to-face teaching and learning, and that the difference was statistically significant across the different modules investigated. Lastly, the results appeared to be pervasive over the time period investigated.

It must be noted that since only one academic field, namely Management Accounting, was used in this study, these results may not translate to other academic fields. Future research could therefore investigate whether these results hold for other academic fields. Secondly, it is suggested that future research could look at constructing a more robust proxy for students accessing and engaging with study material in an ERT setting. Lastly, future research is necessary to identify viable and effective interventions in an ERT context to help students develop SLR strategies, considering that ERT situations are, per definition, unplanned and requires a swift shift to a different mode of teaching.

As Fogarty (2020) points out, the burden of persuasion now rests on those wanting to return to previous methods (mainly face-to-face with minimal digital integration) as opposed to those proposing a more digital offering. If higher education institutions had planned for a more digital offering without COVID-19, instructors and policy makers would have started off with the online learning literature and designed pedagogically well-informed and academically sound processes and procedures to ensure student engagement and effective learning. The risk of the current situation is that instructors have already created the material under ERT conditions (which would largely be face-to-face material swiftly adapted for online presentation) and would likely continue with what they already have. This is especially true for Africa, where the COVID-19 vaccination rate is alarmingly slow and recovery from the pandemic sluggish (Staff Writer 2021). The result will be that institutions might end up with study material which is a combination of ERT, online and face-to-face teaching and learning, which is not well suited for any one of the three offerings.

This study builds on the existing literature and attempts to find similarities and differences between online teaching and learning and ERT environments. It contributes to the ERT literature through evaluating whether perceptions about ERT is evidenced in student behaviour. The future remains extremely uncertain, with wide-ranging opinions on what higher education will look like post-pandemic. However, academics have consensus (at least to some extent) that the new normal should include better planning for future ERT situations.

REFERENCES

- Adhanom Ghebreyesus, T. 2020. *WHO Director-General's Opening Remarks at the Media Briefing on COVID-19 – 11 March 2020*. World Health Organisation. <https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020>. (Accessed 25 February 2021).
- Baker, J. D. 2004. "An Investigation of Relationships among Instructor Immediacy and Affective and Cognitive Learning in the Online Classroom." *Internet and Higher Education* 7(1): 1–13. <https://doi.org/10.1016/j.iheduc.2003.11.006>.
- Baker, R., B. Evans, Q. Li, and B. Cung. 2019. "Does Inducing Students to Schedule Lecture Watching

- in Online Classes Improve Their Academic Performance? An Experimental Analysis of a Time Management Intervention.” *Research in Higher Education* 60(4): 521–552. <https://doi.org/10.1007/s11162-018-9521-3>.
- Bawa, P. 2020. “Learning in the Age of SARS-COV-2: A Quantitative Study of Learners’ Performance in the Age of Emergency Remote Teaching.” *Computers and Education Open*. <https://doi.org/10.1016/j.caeo.2020.100016>.
- Beattie, G., J. W. P. Laliberté, C. Michaud-Leclerc, and P. Oreopoulos. 2019. “What Sets College Thrivers and Divers Apart? A Contrast in Study Habits, Attitudes, and Mental Health.” *Economics Letters* 178: 50–53. <https://doi.org/10.1016/j.econlet.2018.12.026>.
- Broadbent, J. and W. L. Poon. 2015. “Self-Regulated Learning Strategies and Academic Achievement in Online Higher Education Learning Environments: A Systematic Review.” *Internet and Higher Education* 27: 1–13. <https://doi.org/10.1016/j.iheduc.2015.04.007>.
- Castonguay, C. 2020. “What Is the Current COVID Situation for Universities and Colleges Around the World?” *Keystone Masterstudies*. 4 December 2020. <https://www.masterstudies.com/article/what-is-the-current-covid-situation-for-universities-and-colleges-around-the-world/>. (Accessed 25 February 2021).
- Cilliers, J. 2018. “Violence in Africa: Trends, Drivers and Prospects to 2023.” *Institute of Security Studies*. https://media.africportal.org/documents/Violence_in_Africa_-ISS.pdf. (Accessed 26 July 2021).
- Czerniewicz, L., H. Trotter, and G. Haupt. 2019. “Online Teaching in Response to Student Protests and Campus Shutdowns: Academics’ Perspectives.” *International Journal of Educational Technology in Higher Education* 16(1): 1–22. <https://doi.org/10.1186/s41239-019-0170-1>.
- Du Plessis, S. 2020. “Students: Important Information for Online Learning in Term 2.” Stellenbosch University. 17 April 2020. <https://www.sun.ac.za/english/Lists/news/DispForm.aspx?ID=7283>. (Accessed 26 February 2021).
- Elvers, G. C., D. J. Polzella, and K. Graetz. 2003. “Procrastination in Online Courses: Performance and Attitudinal Differences.” *Teaching of Psychology* 30(2): 159–162. https://doi.org/10.1207/S15328023TOP3002_13.
- Fadda, H. 2019. “The Relationship between Self-Regulations and Online Learning in an ESL Blended Learning Context.” *English Language Teaching* 12(6): 87–93. <https://doi.org/10.5539/elt.v12n6p87>.
- Ferri, F., P. Grifoni, and T. Guzzo. 2020. “Online Learning and Emergency Remote Teaching: Opportunities and Challenges in Emergency Situations.” *Societies* 10(4): 1–18. <https://doi.org/10.3390/soc10040086>.
- Fogarty, T. J. 2020. “Accounting Education in the Post-COVID World: Looking into the Mirror of Erised.” *Accounting Education* 29(6): 563–571. <https://doi.org/10.1080/09639284.2020.185>.
- Francis, M. K., S. V. Wormington, and C. Hulleman. 2019. “The Costs of Online Learning: Examining Differences in Motivation and Academic Outcomes in Online and Face-to-Face Community College Developmental Mathematics Courses.” *Frontiers in Psychology* 10: 1–12. <https://doi.org/10.3389/fpsyg.2019.02054>.
- Gelles, L. A., S. M. Lord, G. D. Hoople, D. A. Chen, and J. A. Mejia. 2020. “Compassionate Flexibility and Self-Discipline: Student Adaptation to Emergency Remote Teaching in an Integrated Engineering Energy Course during COVID-19.” *Education Sciences* 10(11): 1–23. <https://doi.org/10.3390/educsci10110304>.
- Gurung, R. A. R. and A. M. Stone. 2020. “You Can’t Always Get What You Want and It Hurts: Learning during the Pandemic.” *Scholarship of Teaching and Learning in Psychology*. <https://doi.org/10.1037/stl0000236>.
- Hodges, C., S. Moore, B. Lockee, T. Trust, and A. Bond. 2020. “The Difference between Emergency Remote Teaching and Online Learning.” *Educause Review* 27 March 2020. <https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and->

online-learning. (Accessed 18 February 2021).

- Iglesias-Pradas, S., A. Hernández-García, J. Chaparro-Peláez, and J. L. Prieto. 2021. "Emergency Remote Teaching and Students' Academic Performance in Higher Education during The COVID-19 Pandemic: A Case Study." *Computers in Human Behavior* 119: 1–18. <https://doi.org/10.1016/j.chb.2021.106713>.
- Jo, I., Y. Park, M. Yoon, and H. Sung. 2016. "Evaluation of Online Log Variables That Estimate Learners' Time Management in a Korean Online Learning Context." *International Review of Research in Open and Distributed Learning* 17(1): 195–212. **Error! Hyperlink reference not valid.**<https://doi.org/10.19173/irrodl.v17i1.2176>.
- Kim, K. J. and T. Frick. 2011. "Changes in Student Motivation during Online Learning." *Journal of Educational Computing Research* 44(1): 1–23. <https://doi.org/10.2190/EC.44.1.a>.
- Klingsieck, K. B., S. Fries, C. Horz, and M. Hofer. 2012. "Procrastination in a Distance University Setting." *Distance Education* 33(3): 295–310. <https://doi.org/10.1080/01587919.2012.723165>.
- Lynch, R. and M. Dembo. 2004. "The Relationship between Self-Regulation and Online Learning in a Blended Learning Context." *International Review of Research in Open and Distance Learning* 5(2): 1–16. <https://doi.org/10.19173/irrodl.v5i2.189>.
- Mahlaba, S. C. 2020. "Reasons Why Self-Directed Learning Is Important in South Africa during the COVID-19 Pandemic." *South African Journal of Higher Education* 34(6): 120–136. <https://doi.org/10.20853/34-6-4192>.
- Michinov, N., S. Brunot, O. Le Bohec, J. Juhel, and M. Delaval. 2011. "Procrastination, Participation, and Performance in Online Learning Environments." *Computers and Education* 56(1): 243–252. <https://doi.org/10.1016/j.compedu.2010.07.025>.
- Mittelmeier, J., J. Rogaten, D. Long, M. Dalu, A. Gunter, P. Prinsloo, and B. Rienties. 2019. "Understanding the Early Adjustment Experiences of Undergraduate Distance Education Students in South Africa." *International Review of Research in Open and Distance Learning* 20(3): 19–38. <https://doi.org/10.19173/irrodl.v20i4.4101>.
- Mohammed, A. O., B. A. Khidhir, A. Nazeer, and V. J. Vijayan. 2020. "Emergency Remote Teaching During Coronavirus Pandemic: The Current Trend and Future Directive at Middle East College Oman." *Innovative Infrastructure Solutions* 5(72): 1–11. <https://doi.org/10.1007/s41062-020-00326-7>.
- Monama, T. 2021. "Universities: 'No Chance' of Face-to-Face Classes in First Quarter of 2021." *News24* 6 January 2021. <https://www.news24.com/news24/southafrica/news/universities-no-chance-of-face-to-face-classes-in-first-quarter-of-2021-20210106>. (Accessed 25 February 2021.)
- Niemczyk, E. K., Z. L. de Beer, and H. J. Steyn. 2021. The Challenges Posed by COVID-19 to the BRICS Education Systems: Lessons to be Learnt. *Perspectives in Education* 39(1): 173–188. <http://dx.doi.org/10.18820/2519593X/pie.v39.i1.11>.
- Ontong, J. M. and S. Mbonambi. 2021. "An exploratory study of first-year accounting students' perceptions on the socio-economic challenges of the transition to emergency remote teaching at a residential university." *South African Journal of Higher Education* 35(5): 256–276. doi:10.20853/35-5-4174.
- Paechter, M. and B. Maier. 2010. "Online or Face-to-Face? Students' Experiences and Preferences in e-Learning." *Internet and Higher Education* 13(4): 292–297. <https://doi.org/10.1016/j.iheduc.2010.09.004>.
- Rabin, L. A., J. Fogel, and K. E. Nutter-Upham. 2011. "Academic Procrastination in College Students: The Role of Self-Reported Executive Function." *Journal of Clinical and Experimental Neuropsychology* 33(3): 344–357. <https://doi.org/10.1080/13803395.2010.518597>.
- Ramaphosa, C. 2020. *President Cyril Ramaphosa: Measures to Combat Coronavirus COVID-19 Epidemic*. South African Government. <https://www.gov.za/speeches/statement-president-cyril-ramaphosa-measures-combat-covid-19-epidemic-15-mar-2020-0000#:~:text=Therefore%2C%20we%20are%20calling%20on,cold%20or%20flu%2Dlike%20symptoms>. (Accessed 25 February

2021).

- Sangster, A., G. Stoner, and B. Flood. 2020. Insights into Accounting Education in a COVID-19 World. *Accounting Education* 29(5): 431–562. <https://doi.org/10.1080/09639284.2020.1808487>.
- Shim, T. E. and S. Y. Lee. 2020. “College Students’ Experience of Emergency Remote Teaching Due to COVID-19.” *Children and Youth Services Review* 119: 1–7. <https://doi.org/10.1016/j.childyouth.2020.105578>.
- Staff Writer. 2020a. “South African Universities Close Early Over Coronavirus Fears.” *Business Tech* 17 March 2020. <https://businesstech.co.za/news/government/382453/south-african-universities-close-early-over-coronavirus-fears/>. (Accessed 25 February 2021).
- Staff Writer. 2020b. “Here’s When South African Students Will Return to University.” *Business Tech* 14 May 2020. <https://businesstech.co.za/news/government/398027/heres-when-south-african-students-will-return-to-university/>. (Accessed 27 February 2020).
- Staff writer. 2021. “Africa’s Lack of Vaccine is Not the Only Reason for Slow Vaccine Rollout.” *Reliefweb* 14 June 2021. <https://reliefweb.int/report/world/africas-lack-vaccine-not-only-reason-slow-vaccine-rollout>. (Accessed 26 July 2021).
- Stellenbosch University. 2020. *Economic and Management Sciences Yearbook*. Stellenbosch: Stellenbosch University.
- Stellenbosch University. n.d.a. *BCom & BComHons: Management Accounting (CIMA)*. [http://www.sun.ac.za/english/faculty/economy/accounting/programmes/academic-programmes/bcom-honsbcom-management-accounting-\(cima\)](http://www.sun.ac.za/english/faculty/economy/accounting/programmes/academic-programmes/bcom-honsbcom-management-accounting-(cima)). (Accessed 2 March 2021).
- Stellenbosch University. n.d.b. *BAcc & PGDA / BAccHons: Chartered Accountant (CA)*. [http://www.sun.ac.za/english/faculty/economy/accounting/programmes/academic-programmes/bacc-bacchons-chartered-accountant-\(ca\)](http://www.sun.ac.za/english/faculty/economy/accounting/programmes/academic-programmes/bacc-bacchons-chartered-accountant-(ca)). (Accessed 2 March 2021).
- UNESCO *see* United Nations Educational, Scientific and Cultural Organisation.
- United Nations Educational, Scientific and Cultural Organisation. 2021. *UNESCO Figures Show Two-Thirds of an Academic Year Lost on Average Worldwide Due to Covid-19 Closures*. Paris: United Nations Educational, Scientifically and Cultural Organisation. <https://en.unesco.org/news/unesco-figures-show-two-thirds-academic-year-lost-average-worldwide-due-covid-19-school>. (Accessed 30 March 2021).
- Usher, M., A. Hershkovitz, and A. Forkosh-Baruch. 2021. “From Data to Actions: Instructors’ Decision Making Based on Learners’ Data in Online Emergency Remote Teaching.” *British Journal of Educational Technology* 52: 1338–1356. <http://dx.doi.org/10.1111/bjet.13108>.
- Wolhuter, C. C. 2021. “Can COVID-19 Bring About 20/20 Acuity in Education Scholarship in South Africa?” *Perspectives in Education* 39(1): 1–11. <http://dx.doi.org/10.18820/2519593X/pie.v39.i1.1>.
- You, J. W. 2016. “Identifying Significant Indicators Using LMS Data to Predict Course Achievement in Online Learning.” *Internet and Higher Education* 29: 23–30. <https://doi.org/10.1016/j.iheduc.2015.11.003>.
- Zimmerman, B. J. 2008. “Investigating Self-Regulation and Motivation: Historical Background, Methodological Developments, and Future Prospects.” *American Educational Research Journal* 45(1): 166–183. <https://doi.org/10.3102/0002831207312909>.